Package ‘ACE.CoCo’

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**Title**  Analysis of Correlated High-Dimensional Expression (ACE) Data

**Version**  0.1

**Description**  A function for estimating factor models. Give factor-adjusted statistics, factor-adjusted mean estimation (one-sample test) or factor-adjusted mean difference estimation (two-sample test).

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**License**  GPL-3

**Encoding**  UTF-8

**Depends**  R (>= 3.6.0)

**Imports**  quantreg

**Suggests**  mvtnorm, MASS

**URL**  https://github.com/hongyuan-cao/ACE

**RoxygenNote**  7.2.3

**NeedsCompilation**  no

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**Repository**  CRAN

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**R topics documented:**

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Description

A function for estimating factor models, giving factor-adjusted statistics.

Usage

ACE(Z, X, H0_indicator, gama)

Arguments

Z The observed data matrix with the variables in rows and samples in columns. It is a $p$-by-$n_1$ matrix.
X (Optional) The observed data matrix with the variables in rows and samples in columns. It is a $p$-by-$n_2$ matrix. If X is present, then perform the two-sample test; otherwise, perform one-sample test.
H0_indicator (Optional) A $p$-dimensional vector containing only 0 and 1. A value of 1 means the variable/gene is non-null and a value of 0 means the gene is null.
gama FDR control level.

Value

An object with S3 class ACE containing the following items will be returned:

- FDP If H0_indicator exists, FDP is true FDP, otherwise, it is estimated FDP.
- Power If H0_indicator exists, power is output which is defined as the ratio of the number of correctly rejected to the number of non-nulls.
- Rejection The number of rejections.
- Adjusted_mean_difference Factor-adjusted mean difference which is a $p$-dimensional vector.
- Adjusted_statistics Factor-adjusted statistics ($p$-dimensional vector).
- Threshold A critical value. When absolute factor-adjusted statistics is larger than the threshold, we reject it.
- Estimated_number_factor The estimated number of factors.
- pai1_hat The estimated proportion of non-nulls.

References


Examples

```r
library(mvtnorm); library(quantreg)
p <- 200; n <- 100; h <- 3 # the number of variables, samples and factors
berlii <- rbinom(p, 1, 0.2) # 1 means the variable is non-null and 0 means it is null.
index0 <- which(berlii == 0); index1 <- which(berlii == 1)

mu <- matrix(rep(0, 1*p), nrow=p)
mu[index1] <- runif(length(index1), min=0.4, max=0.7) # expectation of data
B <- matrix(runif(h*p, min=-1, max=1), nrow=p) # factor loading matrix
t_error <- t(rmvt(n, sigma = diag(p), df = 10)) # error term followed t-distribution
f <- t(rmvt(n, diag(h), df = 4))/sqrt(4/(4-2)) # factor followed t-distribution
Y <- mu %*% matrix(rep(1, n*1), nrow=1) + B %*% f + t_error # data
res <- ACE(Z = Y, H0_indicator = berlii, gama = 0.05)
res$FDP # true FDP
res$Power # power
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